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Hippocampal Sparing During Craniospinal Irradiation: What Did We Learn About the Incidence of Perihippocampus Metastases?

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Abstract

PURPOSE: To identify the incidence of patients with perihippocampal metastases to assess the risk of brain relapse when sparing the hippocampal area. Medulloblastoma (MB) represents 20% of pediatric brain tumors. For high-risk MB patients, the 3- to 5-year event-free survival rate has recently improved from 50% to >76%. Many survivors, however, experience neurocognitive side effects. Several retrospective studies of patients receiving whole brain irradiation (WBI) have suggested a relationship between the radiation dose to the hippocampus and neurocognitive decline. The hippocampal avoidance-WBI (HA-WBI) approach could partially reduce neurocognitive impairment in children treated for high-risk MB.

METHODS AND MATERIALS: From 2008 to 2011, 51 patients with high-risk MB were treated according to the French trial primitive neuroectodermal tumor HR+5. Hippocampal contouring was manually generated on 3-dimensional magnetic resonance images according to the Radiation Therapy Oncology Group 0933 atlas. The distribution of metastases was assessed relative to the hippocampus: 0 to 5 mm for the first perihippocampal area and 5 to 15 mm for the rest of the perihippocampal area.

RESULTS: The median patient age was 8.79 years (33% female). After a follow-up of 2.4 years, 43 patients were alive; 28 had had brain metastasis at diagnosis and 2 at relapse, with 16% in the first perihippocampal area and 43% in the rest of the perihippocampal area. Of the 18 patients without brain metastases at diagnosis, including M1 patients, none developed secondary lesions within the first or the rest of the perihippocampal area, after receiving 36 Gy. No clinical or biological factor was significantly associated with the development of perihippocampal metastases.

CONCLUSIONS: Our results suggest the HA-WBI strategy should be evaluated for the subgroup of high-risk MB patients without metastatic disease.

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